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# Seroprevalence of Hepatitis C Virus in the Families of the Patients with Hepatitis C Infection in Shahre-Kord, Iran

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## Abstract

**Background:** Chronic hepatitis C is a major health concern around the world. Although transmission of hepatitis C virus (HCV) infection through parenteral exposure is well documented, sexual transmission of HCV is still debated. Therefore, we evaluated the prevalence of HCV infection within the families of the patients infected with HCV in a central city of Iran, Shahre-kord.

**Methods:** We examined eighty patients with chronic HCV-associated liver disease and their 230 first degree families in a cross-sectional descriptive serological study. Their serum samples were tested for anti-HCV antibody, using ELISA and Immunoblotting. A questionnaire including risk factors for HCV infection specially drugs addiction, sexual behaviors, and duration of partnership was filled in by the cases.

**Results:** About 2.17% of the household contacts were seropositive. Of them, 8.7% spouses and 20% sisters had anti-HCV antibody.

**Conclusion:** The risk of HCV transmission between monogamous sex partners is higher than that of in other family members, depending on the duration of exposure especially sexual exposure. Infection rate in other family members of HCV-infected persons and community members is the same.

**Keywords:** Intrafamilial transmission; Hepatitis C virus, ELISA; Immunoblotting

## Introduction

Hepatitis C virus (HCV) infection is one of the major public health problems. It is estimated that more than 170 million persons are infected with this virus worldwide.<sup>1</sup> About 50%-85% of the individuals with acute infection develop persistent infection with long term viremia.<sup>2</sup>

The route of HCV transmission is undetermined in most of the infected patients.<sup>3</sup> HCV is transmitted parenterally, especially by transfusion, intravenous drug abuse, and unaccepted needle sticks.<sup>4</sup> Unlike hepatitis

B, vertical transmission of HCV infection from mother to infant is unusual. Although sexual transmission of infection has not been proven, there is some incidental evidence that it occurs. HCV RNA has been detected in the semen and saliva, and persons with multiple sexual partners and commercial sex workers have a high prevalence of infection.<sup>2</sup>

Sexual transmission of HCV has been investigated in homosexual men, those attending clinics for sexually transmitted diseases, spouses or sexual partners of patients with acute or chronic hepatitis C, and persons with hemophilia and leukemia who are infected with HCV. These studies indicate that HCV is infrequently transmitted sexually.<sup>5,6</sup> To determine this, if long-term contacts in the families of the patient contacts were at increased risk for HCV infection

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thorough sexual and nonsexual (causal), we measured HCV-associated antibodies by second generation Elisa and immunoblot test in spouses and first degree families of 80 patients with HCV-related chronic liver disease. In Iran, in most asymptomatic HCV carriers, identified among blood donors by routine screening for anti-HCV.<sup>7</sup>

## Materials and Methods

This study was conducted on a total of 230 family members (household contacts) of the 80 HCV-infected patients (cases). The cases referred to an outpatient clinic in a central city of Iran, Shahre-Kod regularly. They suffered from chronic liver disease and were tested positive for anti-HCV-antibody, using ELISA and Western blotting.

Over a period of 36 months (between May, 2005 and June, 2008), the serum samples were obtained from their household contacts and stored at -70°C until serologic examination. The household contacts were their 55 sexual partners (%23.9), their 5 fathers (%2.2), their 12 mothers (%5.2), their 76 brothers or sons (%33), and their 82 sisters or daughters (%35.7). Their serum samples were tested for anti-HCV antibody, using EIA (DRG, Germany) and Western Blotting (Ortho Neckargemund, Germany).

A questionnaire including sex, age, relationship, duration of contact, household behaviors, and having risk factors for HCV infection was filled in by the household contacts. Before entering the study, a written consent informed was obtained from the subjects.

Data were analyzed using Fisher exact test. Statistical analyses were performed with standard statistical software SPSS version 13. *p* value was considered significant when  $<0.05$ . The study was approved by the ethics committee of Shahre-kord University of Medical Sciences.

## Results

The age range of the participants was 2-66 years with a mean of  $25 \pm 12.1$  years. Of them, 112 (48.5%) patients were female. Five out of the 230 (2.17%) household contacts tested were seropositive. Four of the five (80%) were the cases' wives and the remaining one (20%) was one of their sister. There was not any relationship between ELISA positive test and health behaviors ( $p=0.67$ ). One of the four wives had

less than 15 years contact duration and three of them more than 15 years. The results of Fisher exact test showed that there was a significant relationship between contact duration and ELISA results ( $p=0.016$ ). The result of Mann Whitney test shows that there is a weak relationship between age and seropositivity ( $p=0.066$ ).

## Discussion

The results of another study demonstrated that the overall risk of HCV infection for the household of the patients studied was 2.1% for the original family (their parents and siblings) and 2.3% for their offspring. When sexual partners were considered, however, the risk increased to 13.2%, though the highest risk of HCV transmission in this group regarded the partners of IVD users.<sup>8</sup>

One study in Iran estimated the HCV seroprevalence (1.33%) among the household contacts of HCV-seropositive index cases.<sup>9</sup> Other studies in Pakistan reported that HCV seroprevalence is 16% and 20% among contacts of HCV-seropositive index patients.<sup>10</sup>

Davarpanah et al. in Shiraz, southern Iran showed that among 250 enrolled cases, 188 subjects had HCV mono-infection, 44.1% were genotype 1a, 42.0% genotype 3a, and 13.8% genotype 1b.<sup>11</sup>

Our results differ from those in these studies, reporting a higher rate of HCV infection in the family members of adult patients with chronic hepatitis C. This difference could be attributed to one or more of the following limitations in studies, i.e. a small sample size, inadequate duration, intensity of potential contact with adult patients, low infectivity of HCV in blood, genotypes, and unknown sensitivity of the hepatitis C radioimmunoassay used for detecting HCV infection.<sup>12</sup>

Another study has reported an elevated prevalence of 5.7% among household contacts, compared with HCV seroprevalence of 0.5% in the general population.<sup>13,14</sup>

Recent surveys of sexual or household contacts of HCV infected persons have shown that spouses had higher rates of HCV infection compared with non-sexual household contacts.<sup>15</sup> This prevalence is lower than the one estimated in the Italian general population.<sup>16</sup> When sexual partners are considered, however, the risk increases to 8.7%. For the other household contacts, it was 0.55%. Among 80 HCV-infected cases, 31 patients were IVD users.

Only 3 of 96 (3.2%) regular heterosexual partners without percutaneous risk factors were positive for HCV. Serum anti-HCV antibodies were present in 1 of 89 (1.1%) children without a history of blood transfusion or drug addiction.<sup>17</sup> Hepatitis C virus antibodies were detected in 28 (14%) spouses.<sup>18</sup> HCV Ab seropositivity in the patients' spouses and other family members was 4.1% and 1.5%, respectively.<sup>19</sup> In other studies, transmission to the spouse was 7%.<sup>15</sup> Family transmission from sexual contact is higher than other ways.<sup>20</sup>

There are conflicting data in the literature concerning the role of sexual contacts in the spread of HCV infection. The prevalence of positive anti-HCV in spouses is different and may be a consequence of many factors such as sexual behavior and duration of marriage.<sup>21,22</sup>

In this study, we found that spouses of anti-HCV positive patients were more likely to be infected with HCV than other family members and the infection rate increased with the duration of marriage. In agreement with other authors,<sup>21</sup> we found that positive anti-HCV increased in the spouses with their length of marriage. In particular, a significant difference was found in the prevalence of positive anti-HCV between the spouses married for more than 15 years and those married for a shorter time.

In other surveys, the spouses who had been married to the index cases longer than 20 years had a 7.5-fold risk of HCV seropositivity as compared to those married for a shorter period.<sup>15</sup>

Marriage usually includes a sexual relationship, but also other kinds of body contact and exposure to the same risk factors (i.e. sharing the same personal tools such as toothbrushes, razors, dental appliances, etc.) are effective factors, as suggested by recent findings in Taiwan.<sup>22</sup> We did not perform genotyping in our studied cases but in Iran, genotype (1a) has been identified in the majority of chronic HCV patients.<sup>23</sup>

In another study, the overall prevalence of anti-HCV was 3.2% (2.5% in the absence of previous parenteral exposure). Sexual partners had a seroprevalence of 4.7% and non-sexual contacts, 2.5%. Among non-sexual contacts, parents showed the highest rate (4.2%). The mean duration of exposure in the anti-HCV-positive sexual partners was 17.3±8.5 years vs. 9.2±7.4 years in the anti-HCV-negative sexual partners.<sup>24</sup>

On the basis of this study, we suggest that the risk of HCV transmission between monogamous sex partners is higher than other families, depending on the duration of exposure especially sexual exposure. Infection rate in other family members of HCV infected persons and the whole community was the same.<sup>25,26</sup>

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**Conflict of interest:** None declared.

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